REMARKS

Claims 42-86 are pending in the present application. Claims 1-41 were previously canceled, and claims 45 and 81 are canceled by the present amendment without prejudice or disclaimer. Of the claims pending and under examination, claims 42-44, 47, 55, 57, 65-66, 67-68, 74-77, 80 and 82 have been amended by the present amendment. Claims 83-86 have been added. Example support for reciting an oscillating electrical potential in claim 42 can be found in previous claim 45, which is now canceled, and basis for the mode of operation of the electric potential can be found on page 16, line 31, to page 17, line 6. Similar amendments have been made to method claim 76. New claims 83 to 86 have been added and depend from claim 42 or claim 76 to further limit the direction of movement of the ions in the second phase. Basis for these claims can be found in the same passages as cited above. No new matter has been added.

The Examiner's rejections are directed toward claims 1-41, which were canceled in a preliminary amendment filed with the application. Claims 41-82 differ only in the claim dependencies (*i.e.*, the original dependent claims were multiply dependent, whereas the new dependent claims were not). To advance prosecution, Applicants have applied the Examiner's rejections of claims 1-41 to the corresponding claims 42-82.

35 U.S.C. § 103(a)

Claims 1-41 (which correspond to pending claims 42-82) were rejected as being obvious over Döring (U.S. Patent No. 6,107,624; "Döring") in view of Miller (*Sensors and Actuators B*, 67:300-306, 2000; "Miller").

On page 2 of the Office action, the Examiner characterizes Döring as follows:

> **Döring et al. disclose an ion mobility spectrometer or IMS [abstract] and method of analyzing a sample, comprising an ionizer [ion source, element 2 Fig 1, claim 1], an ion filter where the ion filter defines at least one ion channel along which ions may pass from the ionizer to the ion detector [drift tube, claim 1]; and the spectrometer further comprising control means for applying electric potential to the conductive layers of the ion channel [column 1 lines 9 to 10, claim 1] and an ion detector [column 2, lines 50 to 52, claim 1].**

While Döring describes an ion mobility spectrometer (IMS), that device does not include a filter. The ions in Döring's IMS are separated along the length of a drift tube according to their mass, with lighter ions passing through the drift tube more rapidly than heavier ions (Döring 3:9-18). As the ions are separated, they are detected according to their arrival time at a detector located at the end of the drift tube (the collecting detector) or at a position they have reached along the drift tube (the ring electrodes) (see Döring 4:3-10). A filter is not used for this type of time-of-flight detection.

To better emphasize the significant differences between Döring's time-of-flight IMS and Applicants' device, the present claims have been amended to refer specifically to a *field asymmetric* IMS, which includes a controller configured to apply an oscillating electrical potential that differentially directs ions within a channel defined by a filter. The potential directs ions toward an ion detector in a first phase and in a direction other than toward the ion detector in a second phase. Döring's system lacks a channel defined by a filter and an oscillating electric field.

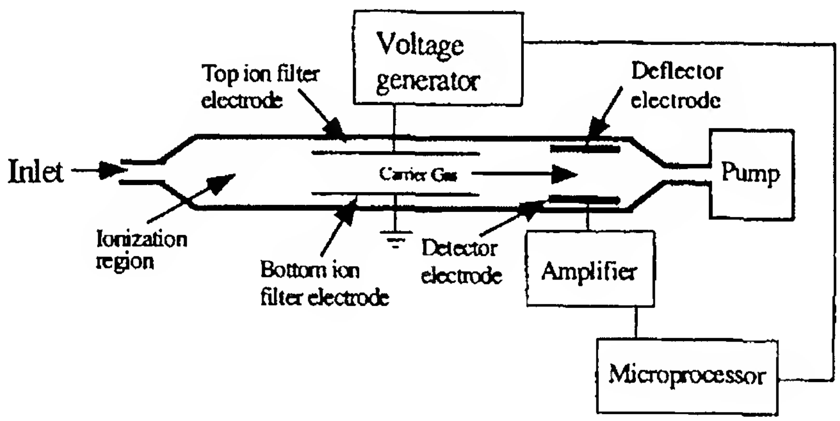
The Examiner recognizes that Döring does not describe an ion channel that is "defined by a plurality of conductive layers separated along the length of the channel by at least one non-conductive layer" (and must therefore recognize that Döring does not teach or suggest a filter, as the channel is defined by the filter) and attempts to find this teaching in Miller. On pages 2-3 of the Office Action, the Examiner states that

> **Miller et al. teach an ion channel is defined by a plurality of conductive layers separated along the length of the channel by at least one non-conductive layer [Section 3.1, page 302], the filter comprises a resistive or semiconductive substrate on which the conductive layers and non-conductive layer are provided [Section 3.1, Fig 3], the substrate is the ion detector [Section 3.1 page 302], and that the ion filter comprises a wafer-like form and comprises a plurality of stacked planar layers [Section 3.1].**

The Examiner then concludes that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Döring et al. and make an IMS that is miniaturized but with the same level of analytic performance" (Office action at page 3).

Applicants respectfully disagree. First, there is no motivation in the prior art to pick and choose any particular element from Miller's field asymmetric device to incorporate into Döring's *time-of-flight* device. As noted above, a time-of-flight IMS relies on detection of ions spatially separated by mass; a filter would not be useful in that context.

Second, Miller says nothing about an ion channel defined by a filter (including in section 3.1 and figure 3, referenced by the Examiner). Even considering the drift tube shown in figure 1 of Miller (reproduced below), it is not at all clear whether Miller has a "channel defined by a plurality of conductive layers separated along the length of the channel by at least one non-conductive layer," as recited by Applicants' claims, because Miller never clearly illustrates the relative positioning any of the conductive and non-conductive layers.



Miller ambiguously notes that "[m]etal electrodes are formed on the top and bottom Pyrex wafers defining the ion filter, deflector, and detector plates" (page 302). However, any non-conductive layer (*e.g.*, the Pyrex wafers) could very well be located outside the ion filter electrode, acting merely as a substrate on which the metal electrodes are mounted.

By contrast, the device Applicants claim must have an ion channel is defined by a plurality of conductive layers separated along the length of the channel by at least one non-conductive layer. See, for example, Applicant's figures 4 and 7, which illustrate a longitudinal separation of conductive layers by non-conductive layers along the channel.

In addition, Applicants' claims, as amended, require the ion filter to be "located between a deflector electrode and the ion detector." Referring to Miller's figure 1, both the top and bottom filter electrode end before either the deflector electrode or the detector electrode begin. In the device of Miller, ions are "passed between the ion filter electrodes and transported to the detector" (page 301). There would be no reason for Miller to further control the path of the ions after they have reached the detector.

The systems and techniques of Miller, whether taken alone or in combination with the systems and methods of Döring, do not describe and would not have made obvious using a field asymmetric IMS, in which the ion channel is defined by a plurality of conductive layers separated along the length of the channel by at least one non-conductive layer and in which the ion filter is located between a deflector electrode and the ion detector. All of the dependent claims are patentable for at least the same or similar reasons that the claims upon which they depend are patentable. As such, Applicants respectfully request the Examiner to reconsider and to withdraw this ground for rejection.

CONCLUDING FORMALITIES

The Petition for Extension of Time fee of $120 is being paid on the Electronic Filing System by way of Deposit Account authorization. Please apply any other charges or credits to deposit account 06-1050, referencing Attorney Docket No. 20511-002US1.

Respectfully submitted,

Date: September 15, 2008

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